Name: KEY **Id#**

COE 205, Term 082
Computer Organization & Assembly Programming

Quiz# 1

Date: Saturday, March 14, 2008

Q1. What is assembly language? How is it related to machine language?

Assembly language is the set of instructions that can be executed by a processor expressed in symbolic form. There is a one to one correspondence between assembly instructions and machine instructions. Machine instructions are represented in binary format.

Q2. List two advantages and two disadvantages of programming in assembly language.

Advantages of programming in assembly language are: accessibility to system hardware and space and time efficiency.

Disadvantages of programming in assembly language are: programs are not portable, program development is slower and program maintenance is more difficult than high-level languages.

Q3. What are the main instruction fields? Give an example.

The main instruction fields are:
- ❖ Opcode field which stands for operation code and it specifies the particular operation that is to be performed. Each operation has its unique opcode.
- ❖ Operands fields which specify where to get the source and destination operands for the operation specified by the opcode. The source/destination of operands can be a constant, the memory or one of the general-purpose registers.

Example: MOV AX, 1. In this example, MOV is the opcode while AX and 1 are the operands.

Q4. Describe the main interface between CPU and memory.

The main interface between CPU and memory consists of the following:
- ❖ Address Bus to hold the Memory address to be read or written
- ❖ Data Bus: b-bit bi-directional bus which transfers data in both directions

❖ Control Bus: Signals that control the transfer of data between CPU and memory including Read request, Write request and Memory function complete.

Q5. Describe how the disk access time is computed.

Disk Access Time = Seek Time + Rotation Latency + Transfer Time

Seek time is the time for the head to move to the track which has the data stored. Rotation latency is the average time for finding the required sector in the track. To find this, we compute it as half the time for the disk to make one complete rotation. The data transfer time is the time to read the data from the sectors which is also related to the rotation time.

Q6. Explain why and how the memory system is deigned in a hierarchical manner.

Due to the widening speed gap between CPU and main memory, main memory became a bottleneck in computer system performance since each instruction requires at least one memory access for reading the instruction and possibly another for reading or storing data into memory.

The memory hierarchy is designed in such a way that memory elements in the top of the hierarchy are the fastest and smallest in size. Then speed and cost decreases and size increases as we go down the hierarchy. This provides a tradeoff between cost and speed. Memory hierarchy is organized as follow: Registers, Level 1 Cache, Level 2 Cache, Main Memory, Disk Storage and Tape.

Q7. What is the instruction set architecture of a processor?

The instruction set architecture of a processor is considered as an interface between software and hardware and consists of instruction set, programmer accessible registers and main memory.